Clean Energy Potential in OTC and Reasonable Level of Commitment for 2007 SIPs

Presented by Art Diem, USEPA

OTC HEDD Meeting, 2/1/2007

EPA

Outline

- EPA Guidance
  - Voluntary and Emerging Measures
  - EE/RE Quantification Guidance
  - Bundled Measures Policy
- How Clean Energy Programs can meet these guidance
- One set of NOx estimates from IPM TRUM analysis

EPA

EPA Guidance

EPA Guidance: Emerging and Voluntary Measures Policy

- "Incorporating Emerging and Voluntary Measures in a State Implementation Plan, 9/04
  - http://www.epa.gov/ttn/oarpg/t1/meta/m8507.html
  - Allows up to 6% of emission reductions to be satisfied by Emerging and Voluntary Measures
  - Emerging Measure = an emission reduction strategy that hasn't been traditionally quantified
  - Voluntary Measure = not "enforceable"
  - An individual measure can be either or both emerging and voluntary

EPA

EPA Guidance: Emission Reductions from Electric-Sector Energy Efficiency and Renewable Energy Measures

- Guidance on State Implementation Plan for Emission Reductions from Electric-Sector Energy Efficiency and Renewable Energy Measures, 8/2004
  - 4 steps for quantification
  - Statements regarding criteria: Enforceable, quantifiable, surplus, permanent

EPA Guidance: Emission Reductions from Electric-Sector Energy Efficiency and Renewable Energy Measures

Quantification Steps:

1. Estimate the energy savings or amount of energy generation that will be displaced
2. Convert the energy impact of a project or initiative into an estimated emissions reduction
3. Determine the impact from the estimated emission reduction on air quality in the non-attainment area (can be based on other efforts/studies etc).
4. Provide a mechanism to validate or evaluate the effectiveness of the project or measure.

EPA Guidance: Emission Reductions from Electric-Sector Energy Efficiency and Renewable Energy Measures

- **Quantifiable:**
  - "Emerging" measure flexibility
    - estimate and measure energy savings, and apply appropriate emission reduction factor
- **Surplus:**
  - Surplus to SIP Baseline and surplus to CAIR
  - Allowance retirement to ensure that the emission reductions due to clean energy (that is, reduced generation from CAIR affected units) are surplus
    - Or
  - Demonstration that reductions would happen without allowance retirement:

    p.10 "Another way is to clearly demonstrate that emissions decrease in the area despite the cap and trade program and the ability for plants to sell more electricity to other areas. This demonstration will likely entail a detailed analysis of electricity dispatch and allowance markets to determine the specific impact of the measures on the system."

- **Permanent:**
  - Sustained level of activity during the SIP time period and the foreseeable future

EPA

EPA Guidance: Emission Reductions from Electric-Sector Energy Efficiency and Renewable Energy Measures

- **Enforceable** (see p. 13 of document):
  - (1) Enforceable directly against a source;
  - (2) Enforceable against another party responsible for the energy efficiency or renewable energy activity; or
  - (3) Included as a voluntary measure

"If the reductions are "enforceable against another party responsible for the energy efficiency or renewable energy activity", then they are considered enforceable if:

(a) The activity or measure is independently verifiable;

(b) Violations are defined;

(c) Those liable for violations can be identified;

(d) You and EPA maintain the ability to apply penalties and secure appropriate corrective actions where applicable;

(e) Citizens have access to all the required activity information from the responsible party;

(f) Citizens can file suits against the responsible party for violations; and

(g) The activity or measure is practicably enforceable in accordance with EPA guidance on practicable enforceability."

EPA

Modeled TRUM NOx Reductions

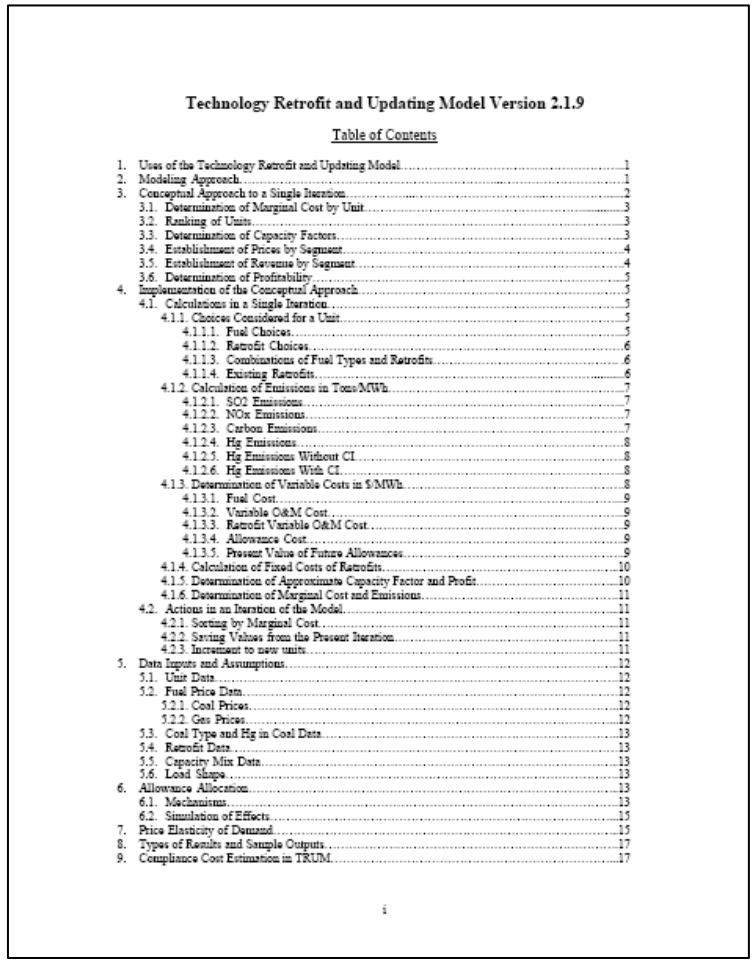
TRUM

- TRUM = The Technology Retrofit and Updating Model (TRUM)
  - Macro-driven spreadsheet model, developed by ICF to supplement the use of its Integrated Planning Model (IPM).
  - Uses a linear programming formulation to select investment options and to dispatch generation and load management resources to meet overall electricity demand and energy requirements (Load duration curve)
  - More simple and streamlined compared to IPM.
  - Runs quickly but does not provide exact solutions.

EPA

TRUM Inputs

- Modeling performed by the Clean Air Markets Division
- Started with 2010 CAIR scenario as a base case
- Reconfigured the modeling exercise to look at episodic period (twelve high electric demand days (based on recent load projected to 2010)
- Included smaller units not subject to cap and trade programs

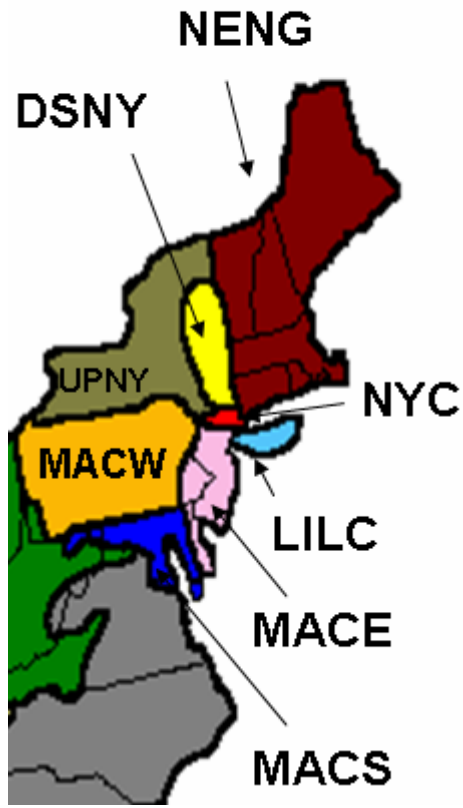


Technology Retrofit and Updating Model Version 2.1.9

Table of Contents

TRUM Inputs: Geographic Extent

- 8 IPM Regions encompassing
  - "classic" PJM,
  - NY, and
  - New England



EPA

TRUM Inputs: Efficiency, Demand Response, PV, Clean DG

2010 *Measures beginning in 2008*	**Low**	**Medium**	**High**
Energy Efficiency (EE)	1% cumulative reduction in load (1,083 MW at peak)	1.5% cumulative reduction in load (1,624 MW at peak)	2.0% cumulative reduction in load (2,166 MW at peak)
Demand Response (DR)	3% reduction at peak hours (3,216 MW at peak)	4% reduction at peak hours (4,266 MW at peak)	5% reduction at peak hours (5,306 MW at peak)
Solar PV, installed capacity	56 MW	112 MW	168 MW
Clean Distributed Generation (DG) in CHP mode, installed capacity	771 MW	1,884 MW	2,975 MW

EPA

Level of Modeled Clean Energy by State (MWh reduced from grid connected EGUs/HEDD)

STATE	EE(1.5%)	DR(4%)*	PV	CHP*
Connecticut	1,497	1,289	-	1,818
Delaware	1,438	989	8	1,461
District Of Columbia	116	595	54	250
Maine	2,682	887	0	2,763
Maryland	2,181	5,189	92	2,307
Massachusetts	2,513	2,978	-	3,146
New Hampshire	407	2,478	-	3,031
New Jersey	6,394	11,475	184	7,272
New York	6,180	7,161	405	7,015
Pennsylvania	6,720	10,405	15	8,598
Rhode Island	2,244	528	-	2,464
Vermont	44	92	0	44
Virginia	83	391	40	83

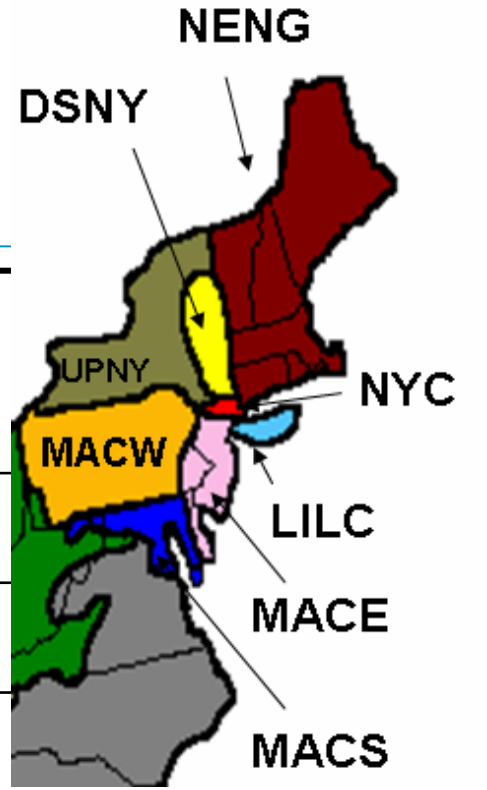
EPA

Level of Modeled Clean Energy by State (Tons NOx reduced from grid connected EGUs/HEDD)

STATE	EE(1.5%)	DR(4%)*	PV	CHP*
Connecticut	1.20	1.68	-	1.38
Delaware	1.25	1.40	0.01	1.29
District Of Columbia	0.10	0.50	0.05	0.21
Maine	0.45	0.34	0.00	0.49
Maryland	4.32	8.41	0.10	4.41
Massachusetts	1.60	2.39	0.00	2.22
New Hampshire	0.49	2.94	-	0.67
New Jersey	6.44	13.48	0.13	6.80
New York	5.85	10.08	0.38	6.50
Pennsylvania	5.35	13.41	0.01	6.01
Rhode Island	0.31	0.15	-	0.39
Vermont	0.06	0.13	0.00	0.06
Virginia	0.06	0.28	0.03	0.06

EPA

IPM Regions

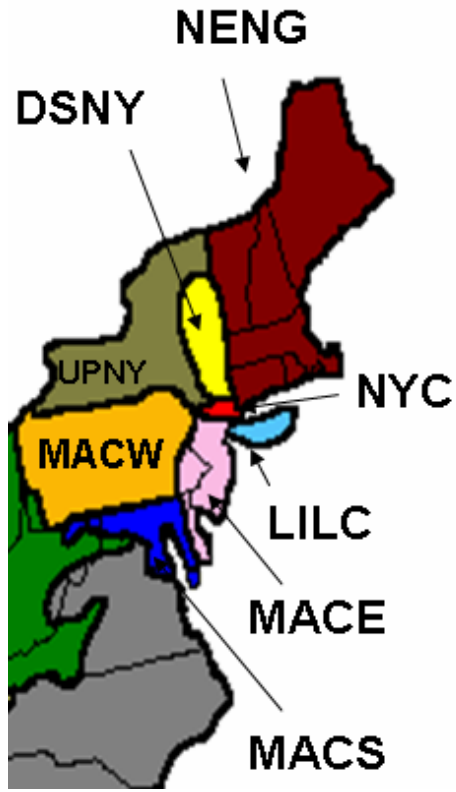


IPM Subregion	Territory Description
NENG	New England ISO
LILC	Long Island
NYC	NYC
DSNY	Counties: Albany, Dutchess, Essex, Fulton, Greene, Orange, Rensselaer, Rockland, Saratoga, Schoharie, Ulster, Warren, Washington, Westchester
UPNY	Rest of NY
MACE	NJ, PA (PECO territory), DE, and MD (Delmarva Power and Light)
MACW	PA (excluding PECO & Duquesne)
MACS	NoVA, DC, MD (BG&E & Pepco)

NOx Emission Reduction Estimates (lb/MWh per HEDD)

Energy Efficiency

DSNY (*NY*)	2.10
LILC (*NY*)	3.71
MACE (NJ, DE, *PA*)	1.87
MACW (*PA*)	1.53
NENG (CT)	0.87
NYC (*NY*)	1.67
UPNY (*NY*)	1.37
MACS (*MD*, DC, *NoVA*)	3.85



EPA

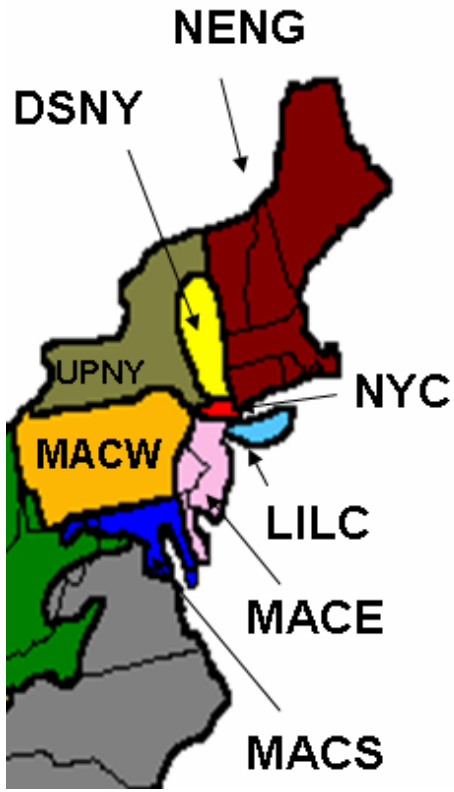
NOx Emission Reduction Estimates (lb/MWh per HEDD)

Solar PV

OTC Wide = 1.74 lb/MWh per HEDD

- OTC Wide PV installation modeled at 112 MW, not enough to produce subregion-specific figures

OTC Wide = 0.0311 lbs NOx reduced per HEDD per kW installed capacity



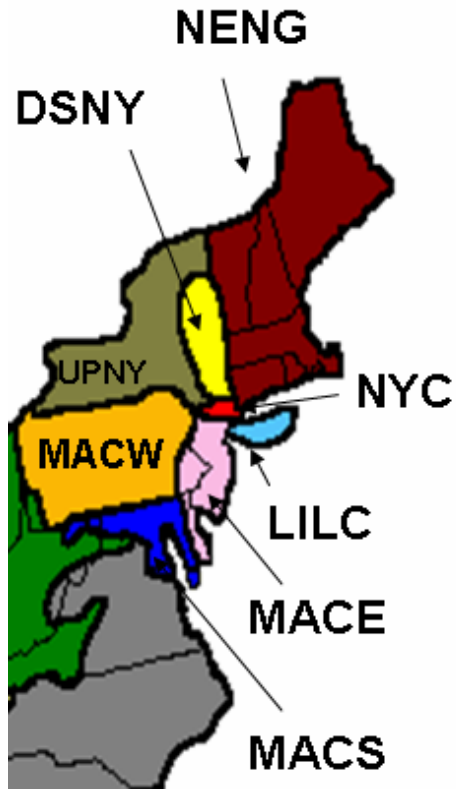
EPA

NOx Emission Reduction Estimates (lb/MWh per HEDD)

Clean Combined Heat and Power Applications

(includes affect on grid connected EGUs only. Does not include changes in emissions on-site)

DSNY (*NY*)	2.06
LILC (*NY*)	3.12
MACE (NJ, DE, *PA*)	1.67
MACW (*PA*)	1.45
NENG (CT)	0.79
NYC (*NY*)	1.63
UPNY (*NY*)	1.38
MACS (*MD*, DC, *NoVA*)	3.69



EPA

Opportunities & Conclusions

EPA

Many Places to Look for More Information and Assistance

Clean EnergyEnvironment STATE PARTNERSHIP

ENERGY STAR

CHP EPA COMBINED HEAT AND POWER PARTNERSHIP

EPA GREEN POWER PARTNERSHIP

http://www.epa.gov/cleanenergy/

US EPA, US DOE, ISOs, PUCs, Energy Offices, National and Regional Organizations,

EPA

Conclusions

- EE & Clean Energy programs are part of the solution to reduce NOx emissions on HEDDs
  - Meaningful emission reductions
  - Cost effective
  - Established policy mechanisms and technologies
- EPA Guidance allows for inclusion of Clean Energy in SIPs
  - Consider TRUM analysis (or other analysis) for estimates of what Clean Energy can achieve, then verify implementation retrospectively
- Continued EPA support to provide tools to ease quantification efforts

EPA